Tule River Hydroelectric Project
Water Conveyance System
Middle Fork Tule River
Springville Vicinity
Tulare County
California

HAER No. CA-216

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
San Francisco, California

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HISTORIC AMERICAN ENGINEERING RECORD

Tule River Hydroelectric Project, Water Conveyance System **HAER No. CA-216**
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Springville Vicinity
Tulare County
California

Location: On the Middle Fork Tule River in Sections 26, 27, 28, 29, 30, and 31 T. 20 S., R. 30 E., Section 36, T. 20 S., R. 29 E., and Section 6, T. 21 S., R. 30 E., M.D.M, Tulare County, California (UTM Coordinates 11/339686/4000919, 11/346496/4003190, 11/346606/4002966), in the western Sierra Nevada Mountain Range about 2 miles east of Springville, California, and 105 air miles north of Los Angeles.

Dates of Construction: 1908-1909, 1930-1931, 1961, 1997

Builder: Globe Light & Power Company/Mount Whitney Power Company,

Present Owner: Southern California Edison Company
2244 Walnut Grove Avenue
Rosemead, CA 91770

Original Use: Hydroelectric Water Conveyance System

Present Use: Hydroelectric Water Conveyance System

Significance: The Tule River Hydroelectric Project is significant for its contribution to the development of hydroelectric power which made possible the expansion of irrigated agricultural in the southern San Joaquin Valley, and for its association with A. G. Wishon who was both a founder of Mount Whitney Power Company and later, as president of San Joaquin Light & Power Company, Mount Whitney's bitter opponent and competitor. The Tule River Hydroelectric Project water conveyance system, although suffering significant alterations from the original, retains its historic setting and feeling of association with the past.

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Environmental Affairs Division
Rosemead, CA 91770

Date: May 1, 1998

I. DESCRIPTION

The source of water to power the Globe Light & Power Company/Mount Whitney Power & Electric Company/Southern California Edison Company Tule River Hydroelectric Project is derived from the North (Doyle) and South (Nelson) Forks of the Tule River Middle Fork. Small concrete dams form the Project intakes and divert water into the water conveyance system. The dam on the North Fork is 44.75 feet long (Photo CA-216-1); the South Fork dam is 123.75 feet long (Photo CA-216-2). A 377 foot long branch flume on the North Fork and a 673 foot long branch flume on the South Fork (Photos CA-216-3, CA-216-4) merge at the junction of the North and South Forks Tule River Middle Fork into a single water conveyance system (Photo CA-216-5) that carries a maximum of about 50 second-feet of water approximately six miles along the north side of the Tule River Middle Fork valley (Photos CA-216-6 and CA-216-7) to the concrete-lined forbay/settling basin at the head of the penstock (Photos CA-216-8, CA-216-9, CA-216-10). Elevation at the intakes is about 2,440 feet, and about 2,390 feet at the forebay for an average grade of 0.002 (2 foot per 1,000 feet) along the flume sections and 0.001 (1 foot per 1,000 feet) in the concrete-lined ditch sections of the water conveyance system. The North Fork intake was originally 17 feet higher in elevation and 200 feet further upstream. It was changed to the present configuration when the San Joaquin Light & Power Corporation built its Tule River plant adjacent and upstream, locating the powerhouse to utilize the lost head in the Mount Whitney Power & Electric Company flume (Fowler 1923:667).

As originally built, the wooden flume box was 4 feet wide and 3 feet deep, constructed of 12 x 1 ½ inch pine planks (Photo CA-216-11). The plank joints were sealed with 4 x ½ inch pine strips on sides and bottom, and a 2 x 2 inch triangular strip in each bottom corner (Fowler 1923:667, SCE Drawing 517827). The flume box was supported on pine bents, stringers, and trusses of mostly 4 x 6 inch and 2 x 6 inch lumber. Flume support foundations were 1½ x 1½ x 1 inch stones, cedar footings, or at the North Fork crossing of the South Fork branch flume 1 in 12 inch battered, mortar-laid, dimension-rock piers (SCE Drawings 517826, 33658, and 33661). Flume sections of the original water conveyance system totaled about 23,500 feet in length.

The concrete-lined ditch sections are 4.5 feet wide on the bottom, 10.5 feet wide at the top, and 3 feet deep (Photo CA-216-12). The concrete lining is on average 2½ inches thick and is covered with a ½ inch coat of gunnite (plaster). Concrete-lined ditch sections of the original water conveyance system totaled about 10,800 feet in length.

There was one inverted siphon on the original water conveyance system. Located across Siphon Canyon about one mile northeast of the forebay, the buried 36 inch diameter siphon is constructed of lap-riveted no. 11 iron sheets and is 879 feet long. There is a 5 foot elevational difference between the siphon's upper and lower ends.

In the years 1930-1931, all of the flume sections were rebuilt with 16 gage metal 61.375 inch diameter "half circle" flume troughs suspended from pine bents, stringers, and trusses of primarily 6 x 6 inch and 2 x 6 lumber (Photos CA-216-13 and CA-216-14, SCE Drawings 520429, 520556, and 520557). The new flume sections were built in the footprint of the original, and at the North Fork crossing utilized one of the two original mortar-laid, dimensional-rock piers (Photo CA-216-3).

In 1960, a wild-fire destroyed the flume sections in an approximately 1.3 mile long segment of the water conveyance system above Coffee Camp Picnic Area. This portion of the water conveyance system was replaced by a "double-barrel" inverted siphon consisting of twin 30 inch diameter metal pipes approximately 4,000 feet in length (SCE Drawings 561463 and 563288). There is a 7.7 foot elevational difference between this siphon's upper and lower ends.

In the late 1980s, steel hand-rails were added to the flume sections in compliance with federal Occupation Safety and Health Administration regulations.

In October 1997, a wild-fire destroyed approximately 1,500 feet of flume in the next canyon east of the double-barrel siphon. The burned flume was replaced with a 600 foot long inverted siphon.

The penstock drops the water from the forebay approximately 1,130 feet to the powerhouse (Photos CA-216-15). The discharge water is returned to the Middle Fork of the Tule River upstream from the powerhouse by way of a 2,352 foot long tailrace. The initial segment of the tailrace is a 220 foot long tunnel which passes under the original transformer room (now an office) (Photos CA-216-16 and CA-216-17) and in front of the operator's cottage (no longer extant) (Photos CA-216-18 and CA-216-19), finally emptying into a concrete-lined ditch which carries the water the remainder of the distance back to the Tule River.

II. HISTORICAL CONTEXT

Development of the Tule River's hydroelectric potential began in September of 1902 when, shortly after his departure from Mount Whitney Power Company in a dispute with principlestockholder John H. Hammond over direction of the Company, Albert G. Wishon[1] filed

[1] Albert G. Wishon, along with William H. Hammond and Benjamin M. Maddox founded Mount Whitney Power Company in 1899 with financial backing from Hammond's older brother, famed mining engineer John Hays Hammond, in order to develop a hydroelectric project on the Kaweah River (Myers 1983:94). Wishon's adamant urging of J. H. Hammond during 1901-1902 to provide additional funding in order to expand Mount Whitney's generation capacity resulted in a irreconcilable split between the two and Wishon's departure (ibid.:95). Wishon's bitter feelings toward J. H. Hammond prompted him as manager of San Joaquin Power Company to block Mount Whitney's expansion by purchasing

for water rights and a powerhouse site on the Tule River Middle Fork (Snyder 1978:4). Also in 1902, a group of San Jose interests incorporated as the Globe Light & Power Company and began acquiring water rights and right-of-ways for another hydroelectric project on the Tule River Middle Fork (Fowler 1923:555). In 1904, Mount Whitney purchased the stock of Globe Light & Power and under the latter Company's name began construction in 1908 of the hydroelectric project (ibid.). In September 1909, the plant was completed and put into operation and on November 8 of that year the properties of Globe Light & Power were deeded to Mount Whitney which re-incorporated under the name Mount Whitney Power & Electric Company (ibid.).

Albert Wishon, seeking financing in Los Angeles for his Tule River power project, was offered the position of manager of the San Joaquin Power Company by William G. Kerckhoff and Allan C. Balch (Snyder 1981:1 & 2), at that time partners of Los Angeles real estate and interurban railroad developer Henry E. Huntington. Under Wishon's direction, the Tule River hydroelectric plant on the San Joaquin Power Company was built slowly beginning in 1903, an finally began operation on January 21, 1914 (Snyder 1978:1-4). The San Joaquin Power Company powerhouse is located at the North Fork of the Tule River Middle Fork (Doyle Fork) intake of the Mount Whitney plant, and derives its water solely from that fork (the Mount Whitney plant has intakes on both the North and South Forks of the Tule River Middle Fork).

In June 1916, Henry Huntington purchased John H. Hammond's controlling interest in the Mount Whitney Power & Electric Company (Myers 1983:99). The following year, Henry Huntington merged his electrical utility businesses with Southern California Edison (ibid.). Mount Whitney continued operation as a subsidary of Edison until 1920 when it ceased to exist as a separate entity (ibid.).

Electricity generated by the Tule River plant and other hydroelectric projects owned by Mount Whitney Power & Electric Company and Wishon's San Joaquin Power Company played a crucial role in the development of agriculture in the San Joaquin Valley. The inexpensive energy produced by these facilities was used to drive electric pumps which contributed significantly to the rise of wide-spread irrigated farms. Prior to this development irrigated agriculture was mostly dependent on diversions from local rivers and streams, supplemented in the dry months with expensive and unreliable gasoline-engine powered pumps. Farms during the pre-hydroelectric period were exclusively located within a short distance of water courses. Inexpensive and reliable electric pumps allowed farms to be sited anywhere. The former dry valley floor rapidly flourished with cultivation, and the demand for electricity grew faster and far beyond the wildest expectations of the developers of these pioneer hydroelectric facilities.

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adjacent electrical utility companies and encircling Mount Whitney's service territory with San Joaquin Power's transmission lines (ibid.:95-97).

III. SOURCES

Fowler, Frederick H.
1923 Hydroelectric Power Systems of California and Their Extensions into Oregon and Nevada. Department of the Interior, United States Geological Survey, *Water Supply Paper 493*. Washington, DC: Government Printing Office.

Myers, William A.
1983 *Iron Men and Copper Wires*: A Centennial History of the Southern California Edison Company. Glendale: Trans-Anglo Books.

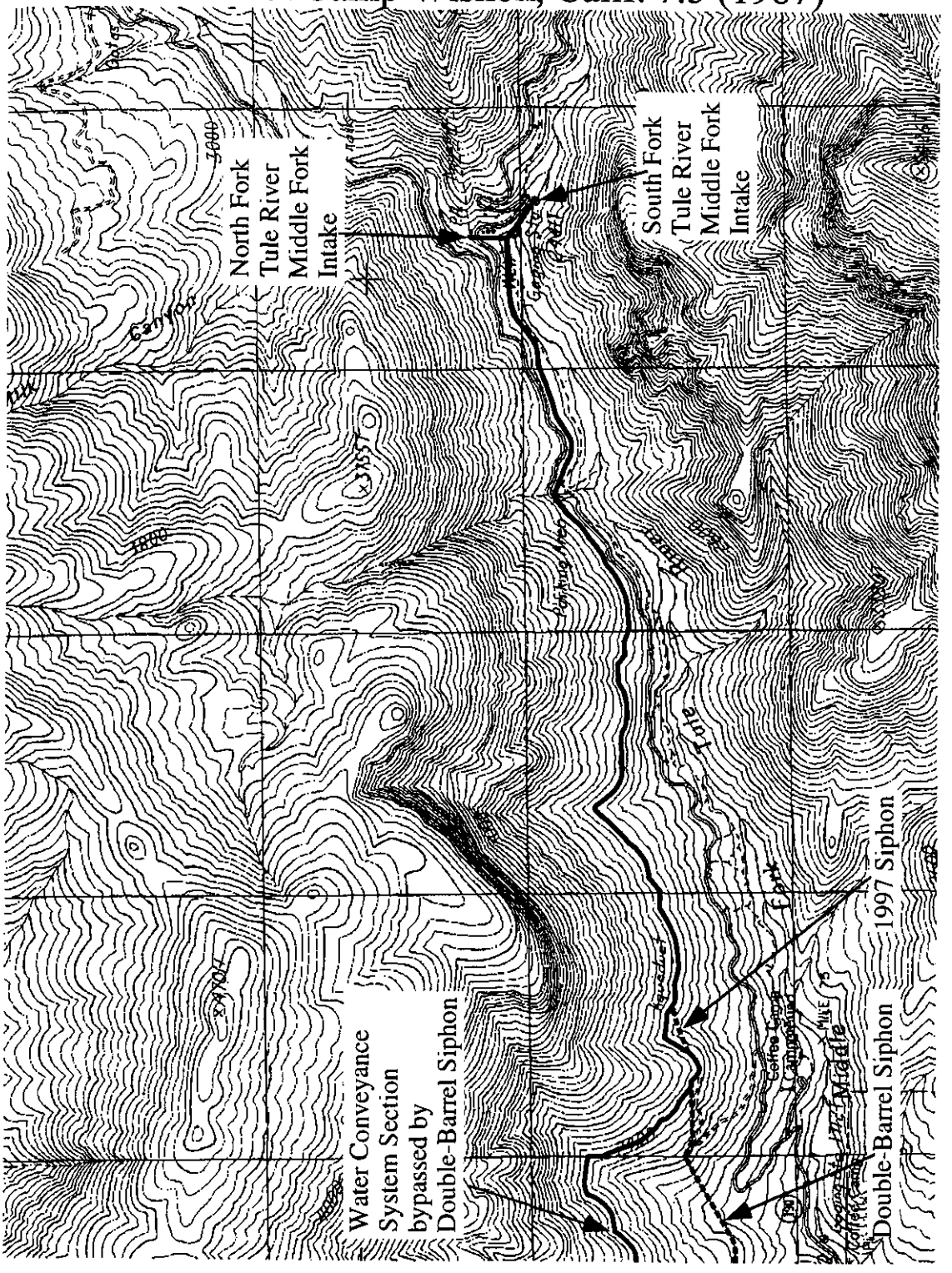
Snyder, John W.
1978 Report on Bridge 46-10 on 06-TUL-190, P.M. 40.07. Report to Frank Waterhouse, Chief, Environmental Branch, District 06, California Department of Transportation. Sacramento: California Department of Transportation, Office of Environmental Planning.

1981 An Evaluation of Tule River Hydroelectric Complex. Report to Frank Waterhouse, Chief, Environmental Branch, District 06, California Department of Transportation. Sacramento: California Department of Transportation, Office of Environmental Planning.

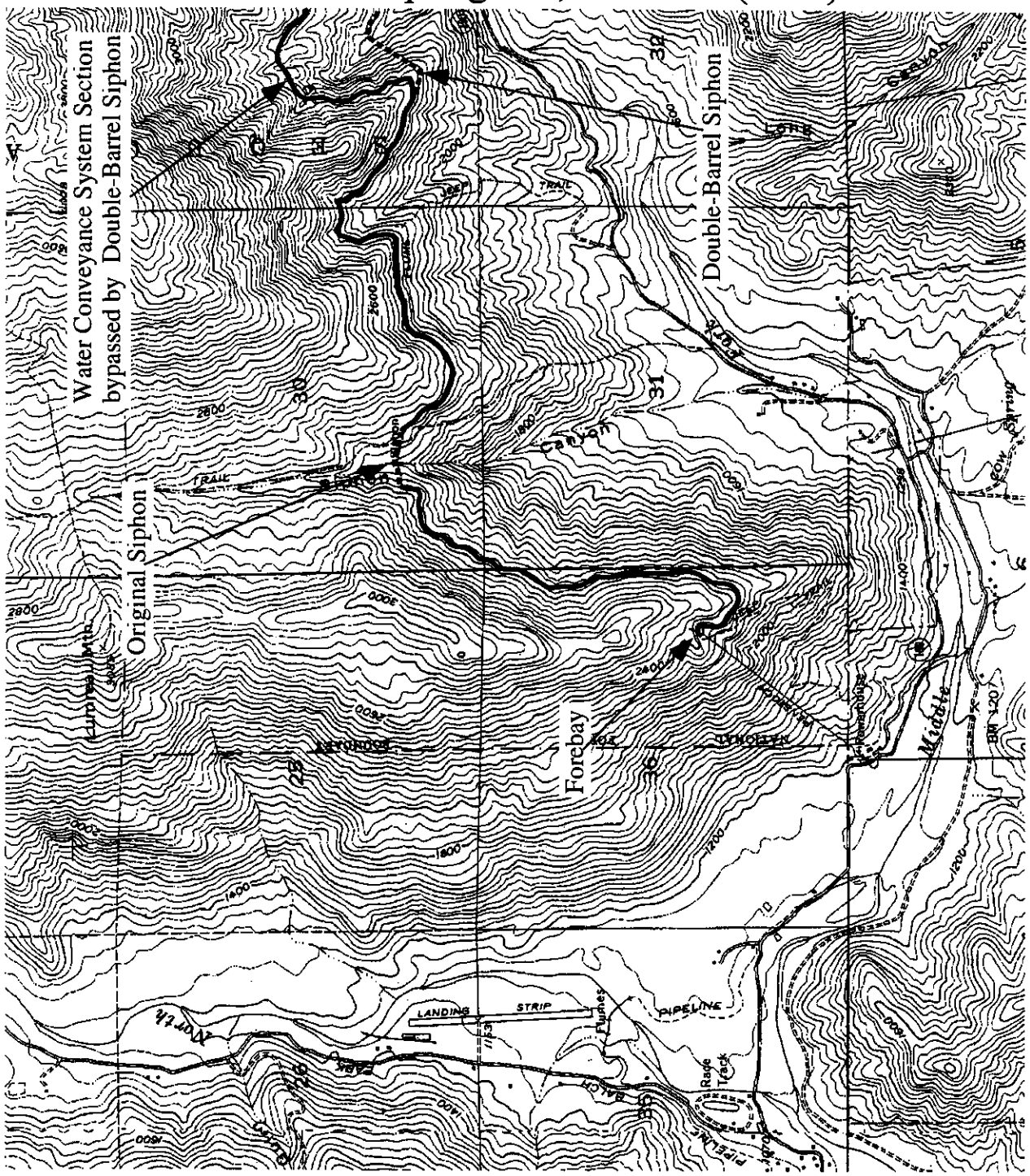
IV. PROJECT INFORMATION

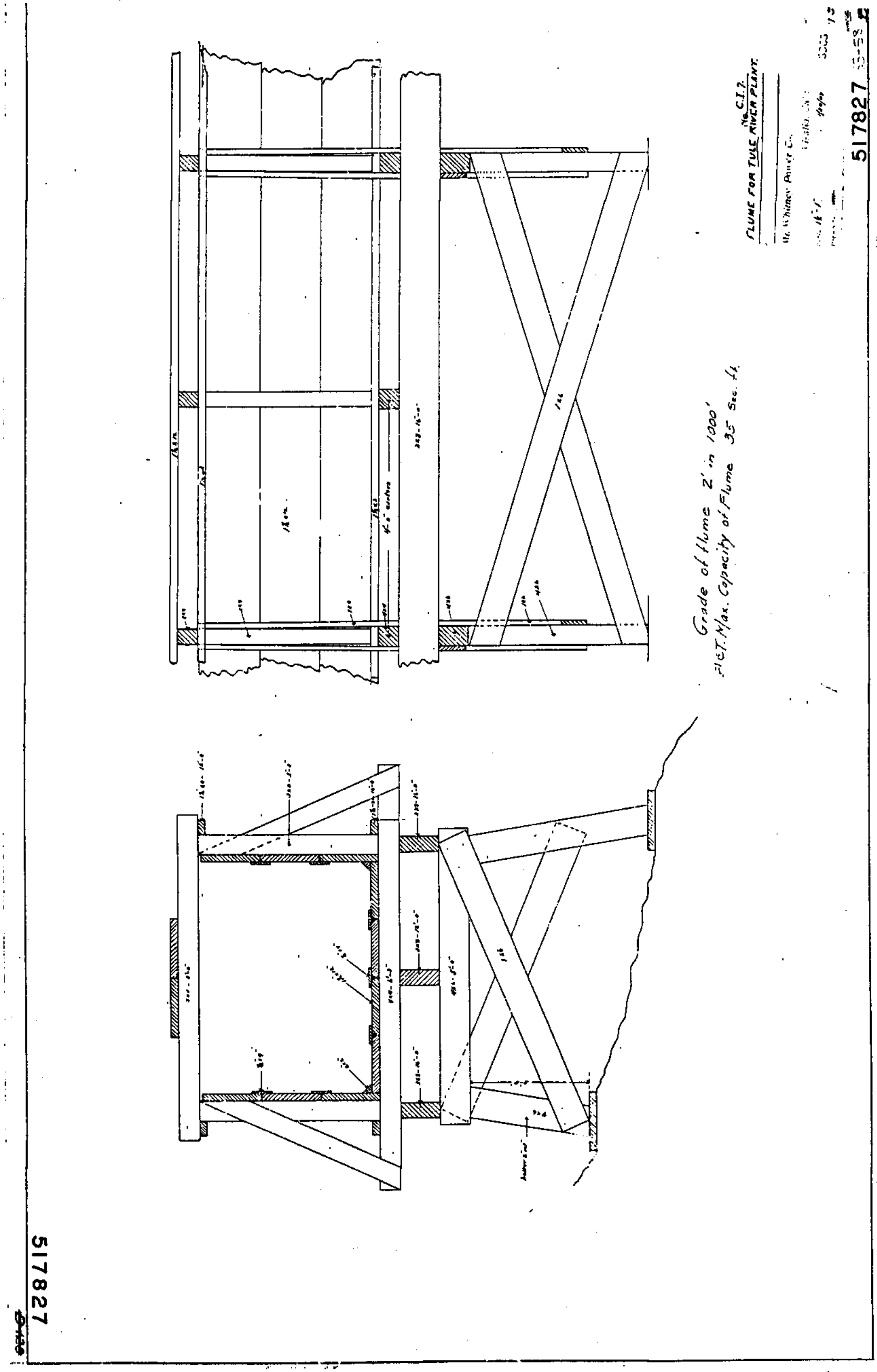
This Historic American Engineering Record (HAER) documentation of the Tule River Hydroelectric Project water conveyance system was undertaken as mitigation for the reconstruction of an approximately six hundred foot section of flume, burned in a wild-fire during October 1997, with an inverted siphon. The purpose of the HAER documentation is to conserve the historic look of the wood bent-supported flumes that comprise about two thirds of water conveyance system (the other third of the water conveyance system is comprised of concrete-lined canals and two other inverted siphons). Wild fires are endemic to the dense chamise chaparral covering much of the project area and pose a threat to the remaining wood-bent supported flumes. In order to maintain the viability of the hydroelectric project, burned flume sections are replaced where feasible with metal siphons which are less vulnerable to this type of natural disaster.

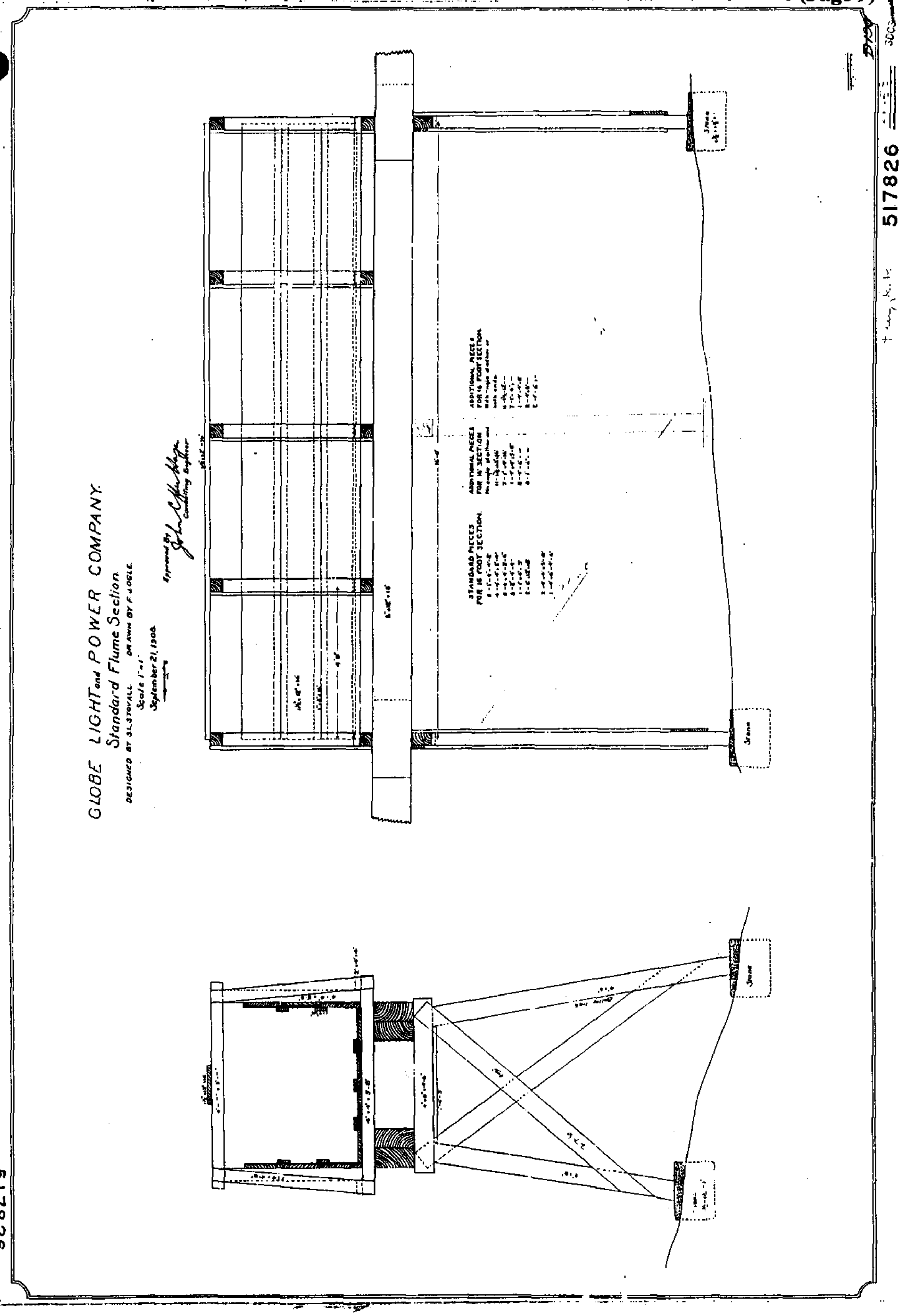
Portion of Camp Wishon, Calif. 7.5 (1987)



Portion of Springville, Calif. 7.5 (1957)







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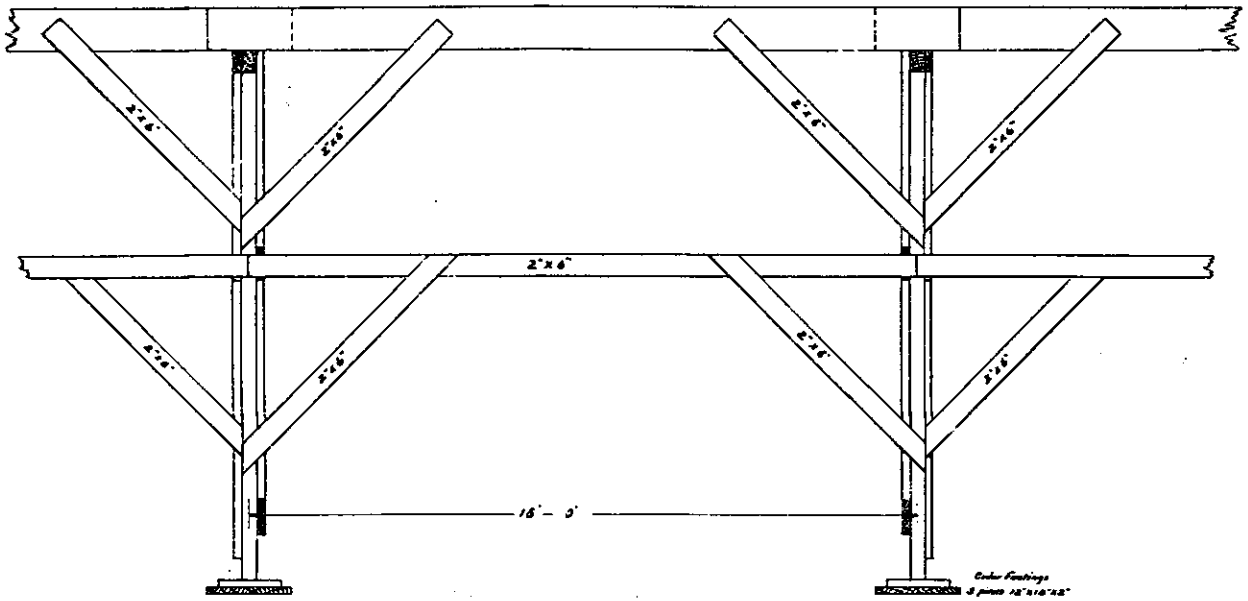
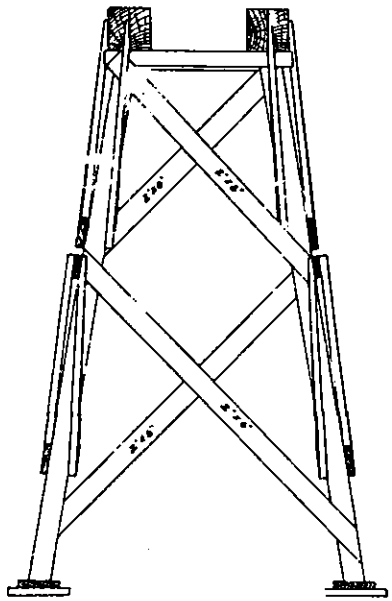


Note:- CONSTRUCTION WHERE POSTS ARE LESS THAN 12 Feet.



MT. WHITNEY POWER and ELECTRIC Co.
John Coffin Hays President and General Manager
BRACING FOR TULE RIVER FLUME
S.L. Stovall
10-11-1910
Scale ½" = 1'

O.K. JOHN

33658

~~B185~~

GLOBE LIGHT and POWER COMPANY.

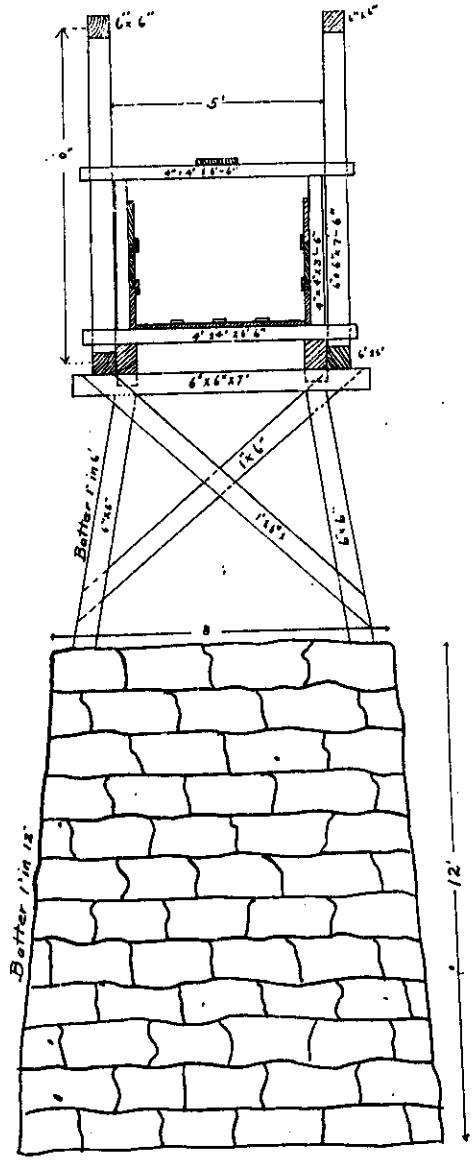
End View of Truss and Pier.

S.L. STOVALL, ENGR. OCT. 10th 1908 W.H.H.

Scale: 1" = 2'

Dwg # 8

Approved By _____ Consulting Engineer



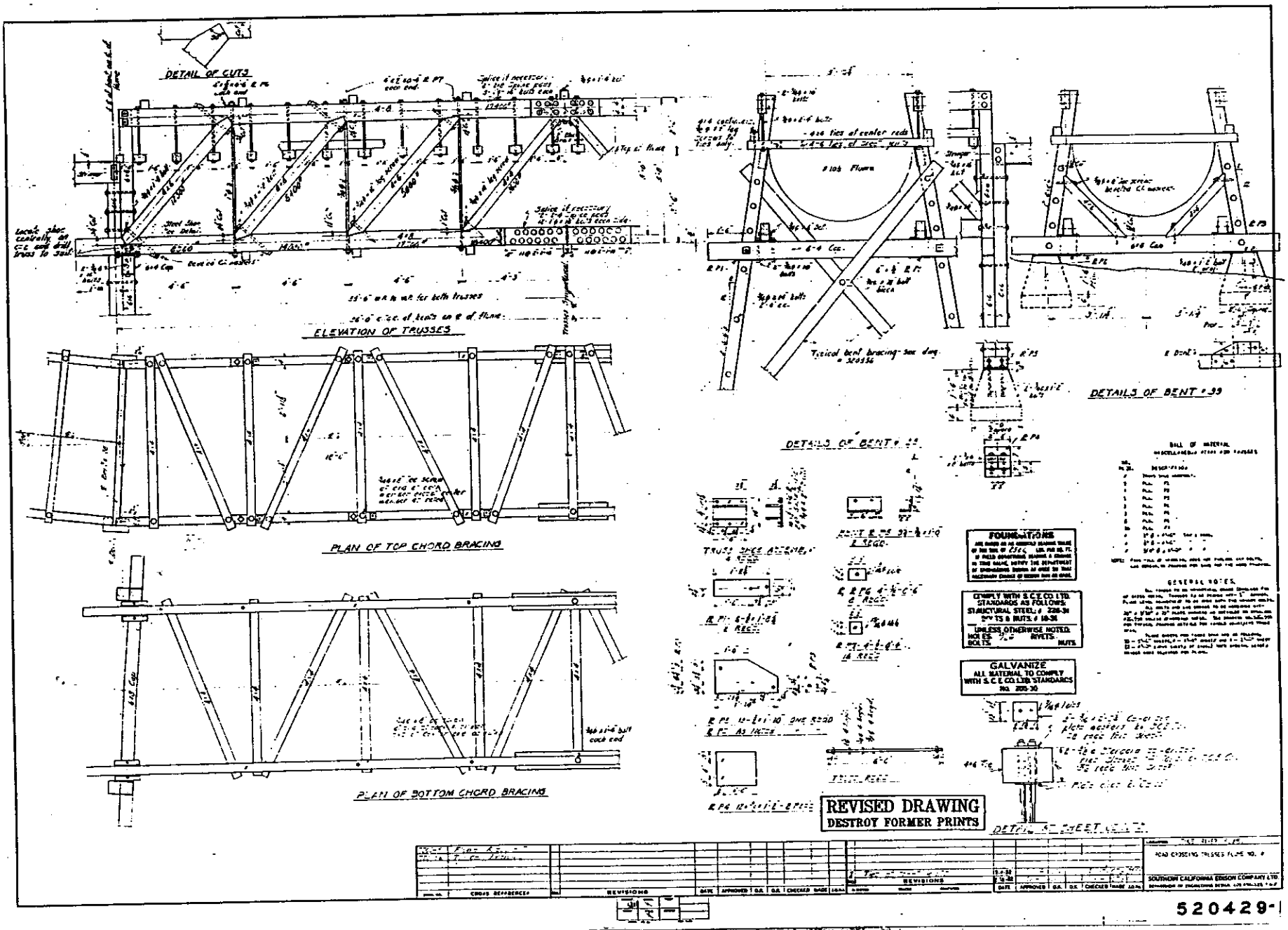
Material For Truss

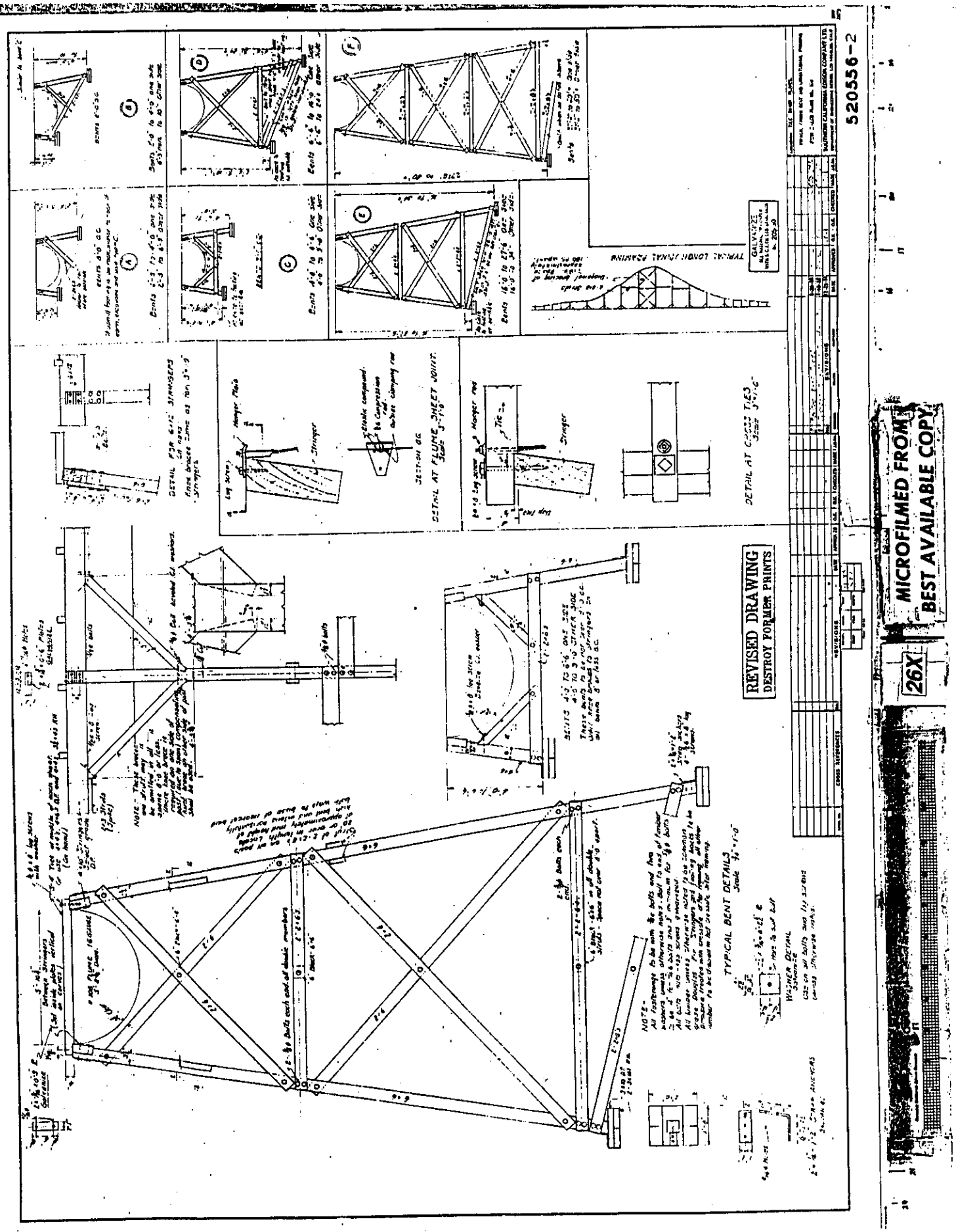
Hardware

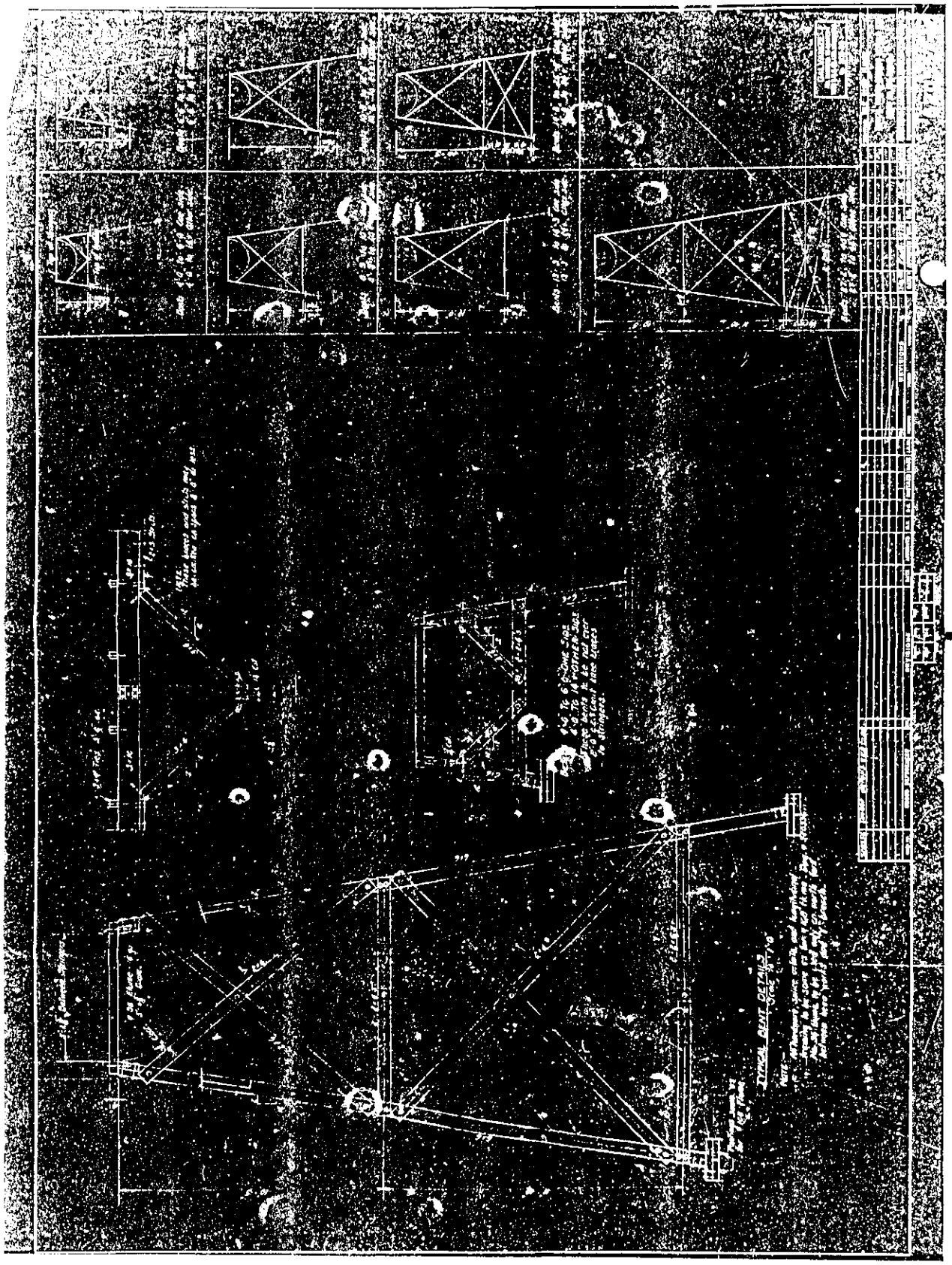
2, stirrups.
12, splice plates, ½" x 6" x 24".
8, rods, ¾" x 3'-6", threaded 4" each end.
4 " " x 5'-0" " " " "
4 " " x 1'-8" " " " "
16 angle washers, ¾".
32 nuts ¾".
16 cast-iron washers, ¾".
38 bolts ½" x 8" and nuts.
6 " ½" x 12" " "

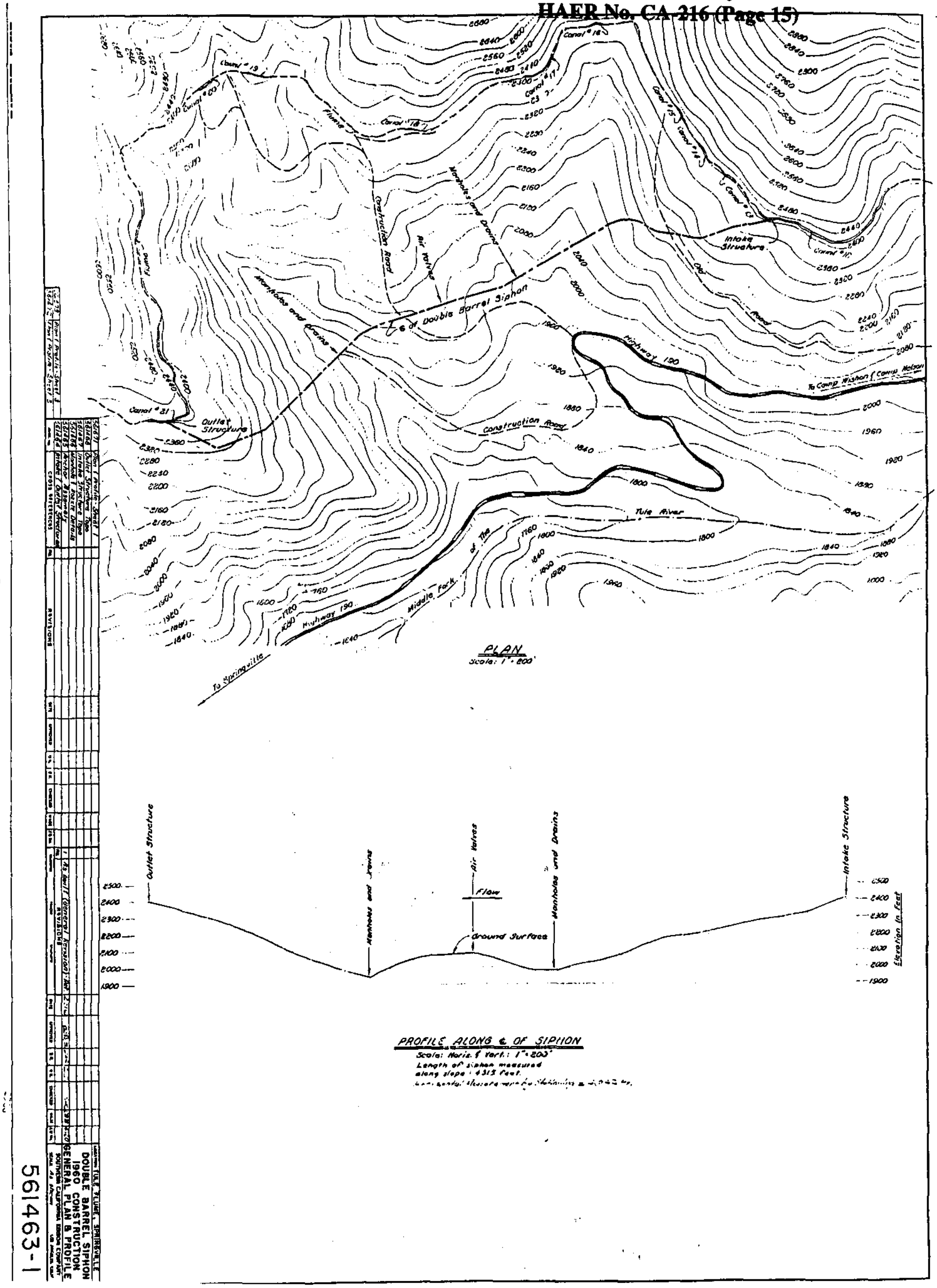
Lumber.

22 - 1½" x 12" x 16'-0"
11 - " x " x 12'-6"
11 - " x " x 5'-6"
14 - 1" x 4" x 16'-0"
7 - " x " x 12'-6"
7 - " x " x 5'-6"
24 - 4" x 4" x 5'-6"
2 - 6" x 6" x 18'-0"
2 - " x " x 16'-0"
2 - " x " x 16'-0"
6 - " x " x 7'-6"
4 - " x " x 11'-3"
4 - " x " x 17'-0"
2 - " x " x 7'-0"
4 - " x " x — posts
5 - 4" x 4" x 6'-6"
4 - 4" " " x — stringer braces.
4 - 1" " " x — post braces
11 - 4" x 6" x 2'-6"
9 - 6" x 6" x 2'-6"




520556-2
REVISED DRAWING
DESTROY FORMER PRINTS
TYPICAL BENT DETAILS
DETAIL AT FLUME SHEET JOINT
DETAIL AT CROSS TIES
DETAIL FOR GUIDE STRINGERS
TYPICAL LOWER LATERAL FRAMING
WASHER DETAIL
MICROFILMED FROM
BEST AVAILABLE COPY
26X




Canal #19
Canal #18
Canal #17
Canal #16
Canal #15
Canal #14
Canal #21
Flume
Construction Road
Manholes and Drains
Air Valves
℄ of Double Barrel Siphon
Intake Structure
Outlet Structure
Highway 190
To Camp Wishon & Camp Nelson
Tule River
Middle Fork of the
To Springville
PLAN
Scale: 1" = 200'
Flow
Ground Surface
Elevation in Feet
PROFILE ALONG ℄ OF SIPHON
Scale: Horiz. & Vert.: 1" = 200'
Length of siphon measured along slope: 4313 feet.
TULE FLUME, SPRINGVILLE
DOUBLE BARREL SIPHON
1960 CONSTRUCTION
GENERAL PLAN & PROFILE
SOUTHERN CALIFORNIA EDISON COMPANY
561463-1

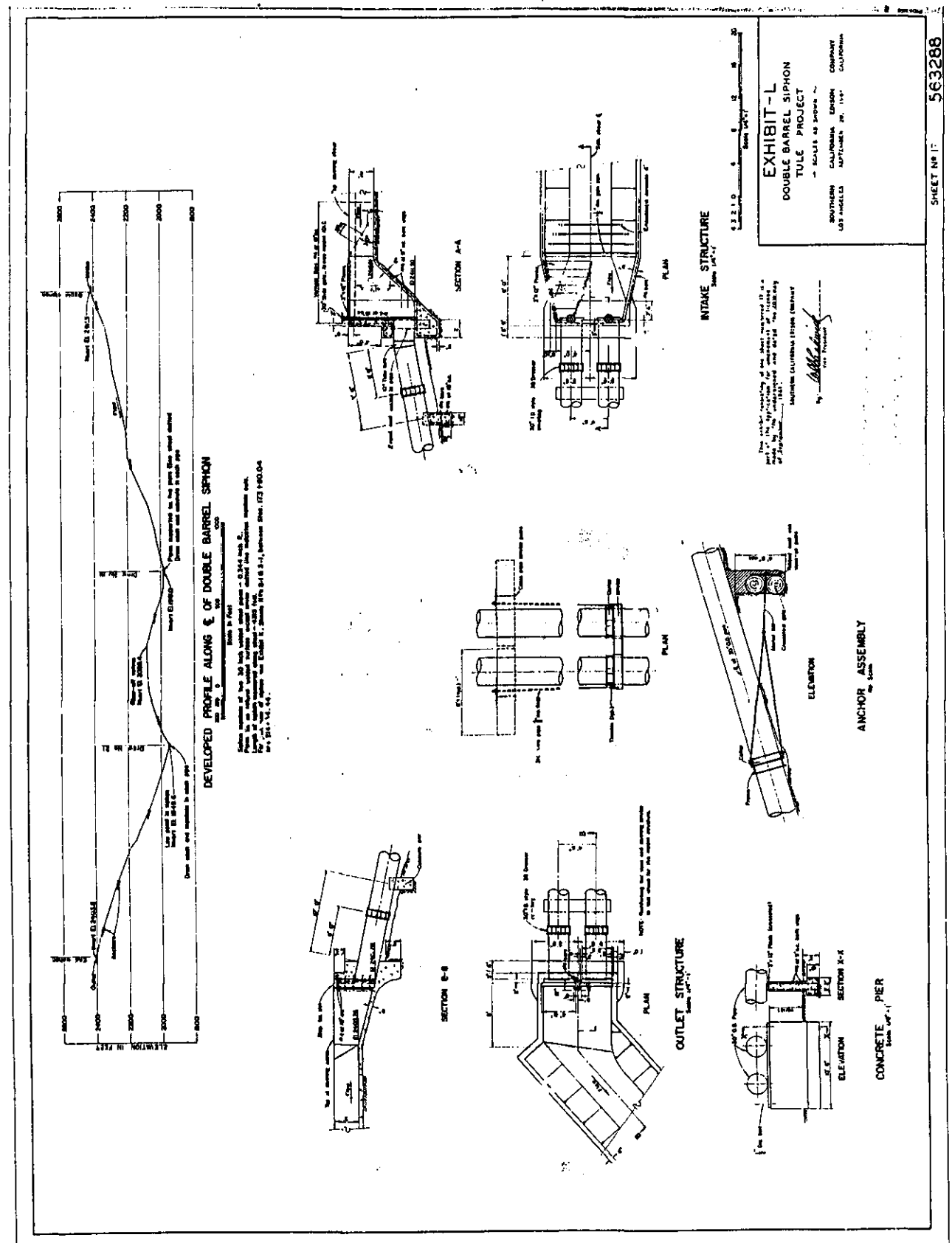


EXHIBIT-L
DOUBLE BARREL SIPHON
TULE PROJECT
SHEET Nº 1 OF
563288
DEVELOPED PROFILE ALONG ℄ OF DOUBLE BARREL SIPHON
SECTION A-A
PLAN
INTAKE STRUCTURE
PLAN
ELEVATION
ANCHOR ASSEMBLY
SECTION B-B
PLAN
OUTLET STRUCTURE
ELEVATION
SECTION X-X
CONCRETE PIER